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XVIII.—ON THE LIFE HISTORY OF THE ROSE
BLOTCH FUNGUS.

STUDIES FROM THE PATHOLOGICAL LABORATORY: VIII.

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(With Plate.)

The fungus *Actinonema rosae* is familiar to all rose growers in this country who know only too well the black blotches it produces on the leaves of many kinds of roses. All through the summer and autumn months it produces conidia in great abundance, infecting the new foliage of growing shoots as fast as it develops. The fungus not only greatly disfigures the rose foliage, but it actually weakens the shoots through the destruction of the leaf tissues and the premature defoliation which bad attacks bring about.

In devising methods of control there has always been a difficulty, since mycologists until recently have been without information as to its method of hibernation and the origin of the new attack each season. Recently this problem has been solved for the United States through Dr. F. A. Wolf, of Cornell University, having found an ascigerous stage on the dead leaves (Bot. Gaz. 1912, Sept. p. 218). The perithecia mature in April, discharging ascospores which infect the young foliage as it unfolds. To this form Dr. Wolf has given the generic name *Diplocarpon*. The new genus belongs to the family *Microthyriaceae* (*Perisporiales*). This family is characterised by having perithecia which are shield-shaped, flat, with a round pore at the apex and a membrane formed only on the upper side. Dr. Wolf examined other genera of this family, but came to the conclusion that the fungus was sufficiently distinct to be regarded as a distinct genus. His observations on the conidial stage show that the genus *Marsonia* (to which Professor Trail referred the fungus in 1889, see *Scottish Naturalist*, vol. iv, N.S. 1889-90, p. 73, and with which it agreed in some respects) was not altogether suitable for its reception.

The development of an ascigerous stage does not seem to take place in Great Britain, for though it has been repeatedly searched for, it has not yet been found. In 1916 leaves of roses affected with Black Blotch and collected at Lyndhurst in September were

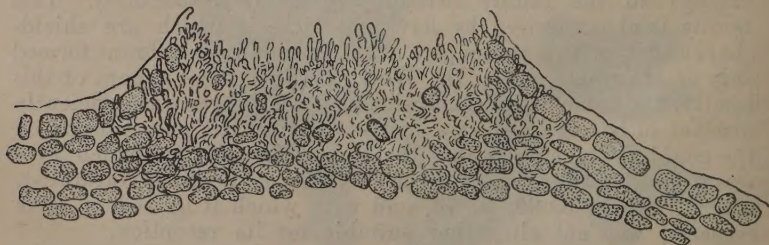
brought to Kew and kept out of doors under fairly natural conditions. When examined in spring no ascigerous stage had appeared nor has any British botanist, as far as we know, succeeded in finding perithecia.

When pruning roses this spring patches of discoloured tissue were noticed on the young wood of the previous season, apparently caused by some fungus trouble. The variety on which they occurred was Juliet. On examination these were found to contain abundant mycelium and compact masses of fungus-tissue bearing spores of *Actinonema rosae*.

Description of infected wood.—The infected areas present a blackened, blistered appearance dotted with pustules (Plate VI), the fungus forming a stromatic cushion or pad below the cuticle (Figs. I & II). The mycelium itself is colourless, and was, as far as the material showed, confined to the cortex, where it developed considerably and killed the tissues. The spores and conidiophores of the sorus or acervulus (Fig I) stand out clearly amid the surrounding cells, the contents of which become dark, and in later stages completely disorganised. If one of the stromatic cushions be sectioned it will be found to be composed of a thick mass of closely interwoven hyphae which develops immediately beneath the cuticle and forces it upwards until it is finally ruptured (Fig. II). In spring the mycelium gives rise to numbers of short conidiophores at right angles to the cushion. The



Text fig. 1.—Section through the cortex of a one-year old shoot showing young acervulus with conidiophores and spores. $\times 200$.



Text fig. 2.—Section through dormant cushion on a one-year old rose shoot showing compact mycelial tissue commencing to give rise to spores in spring. $\times 200$.

conidiophores bear spores which are precisely similar to those formed on the leaves, namely, hyaline, 2-celled, and oval to elliptic in shape. In size they vary a good deal, being 17-26 μ long by 5-6 μ . They are somewhat constricted at the septum, and occasionally the two cells separate and function as two distinct spores. The spore-bearing layers were found not only in the outer cortical tissues, but also in cavities situated deep in the cortex, and formed apparently by the development of mycelium. The fungus produces spores in profusion in these spaces, the conidiophores in many cases lining both sides of the spaces, and thick mycelial cushions may even occasionally be developed. When the spores mature, they are apparently liberated into the central cavity.

In the case of rusts, internal sori are not uncommon, and have been found in *Uromyces caryophyllinus*, *U. caladii*, *Puccinia graminis*, *P. glumarum*, and others. *Cronartium ribicola* occasionally forms teleutospores deep in the tissue of the petiole, and the teleutospores have been found to be living after a considerable time, even in comparatively dry conditions (*see* Colley, Journ. Agric. Research, vol. viii, 1917, pp. 329-332; Adams, Mycologia, vol. viii, 1916, pp. 181, 182).

A feature of interest in connection with the above discovery is the fact that the difference in the methods of hibernation in England and the United States is exactly comparable to that which occurs in these two countries in the case of the Apple Scab fungus (*Venturia inaequalis*).

In Germany and America the scab fungus has been found to produce perithecia in the dead tissues of the leaves and to liberate ascospores in spring (Aderhold, Ber. Deut. Bot. Gesell., vol. xii, pp. 338-342; Wallace, Cornell University Bulletin No. 335, 1913). In England the ascigerous stage, though often sought for, has never been found. In 1906, however, Mr. Salmon discovered that the *Fusicladium* stage formed mycelial cushions on the young wood which remained dormant till spring, when they produced and liberated spores (Gard. Chron., July 14, 1906, p. 21; Journ. S.E. Agric. Coll., Wye, 1907, p. 291). The cushions produced by *Actinonema rosae* are precisely comparable to those of *Fusicladium*, and function in the same manner. It should however, be mentioned that since Mr. Salmon's paper appeared, specimens of apple and pear twigs bearing the same cushions have been found in some of the Atlantic States (Maine Agric. Expt. St. Bulletins No. 223, 1914; No. 252, 1916; Phytopathology, vol. iii, p. 265, 1913).

Varieties Attacked.—The season was well advanced (April) when the infection on the young wood of Juliet was first observed, consequently roses in most gardens had already been pruned and it was not possible to obtain much further material, or a full list of varieties which are infected in this manner. The fungus is scarce in the Royal Botanic Gardens, Kew, and soon apparently dies out if introduced in the neighbourhood. A visit was therefore paid to the Royal Horticultural Society's Gardens at Wisley where, thanks to the kind help afforded by the Superintendent,

Mr. S. T. Wright, the following varieties were found to be attacked on the wood, Madame Ravary, La Tosca, Mrs. David Jardine, Gruss an Teplitz, which are all hybrid teas, and Juliet. The last named is an Austrian Briar—tea hybrid, and it apparently inherits from the Austrian Briar a great tendency to black blotch.

Control Methods.—The discovery of the winter stage on the wood necessitates a modification in the methods of control. Up to the present, owing to lack of information as to its behaviour in Britain and from the fact that ascospores are produced in America on the old leaves in spring, stress has always been laid on the collecting and burning of diseased leaves. As far as is known, however, this is not of avail for this country,* and the attention of the cultivator should be turned to the use of the pruning knife. The plate shows the close proximity of the delicate young foliage to the spore pustules, and demonstrates the ease with which it would be infected. Pruning, however, will need to be carried out with care as the requirements of the different groups of roses will have to be studied in addition to the necessity of removing all affected wood. As far as has been observed the old pustules on the two-year old wood become effete, and do not bear spores. Attention need therefore only be concentrated on the wood of the previous season. It should, however, be remembered that not all brown specks and spots on rose wood are due to *Actinonema*, and in case of doubt specimens should be examined microscopically.

With regard to spraying, liver of sulphur has been recommended in this country, but in many cases without much success. This was probably partly due to its being applied late in the season, when the fungus had obtained a firm hold on the tree. Experimental work on spraying has been carried out in America, and a series of trials conducted by Mr. L. M. Massey at Ithaca (Phytopathology, vol. viii, no. 1, Jan. 1918, p. 20) showed that dusting repeatedly with a powder composed of 90 parts finely ground sulphur and 10 parts powdered arsenate of lead was very effective in controlling blotch. In these trials the trees were dusted eight times during the season. The next most effective agents were found to be Bordeaux mixture 5-5-50, and lime sulphur, but both of these much disfigured the trees.

In gardens which suffer severely from black blotch it would be advisable to spray or dust the trees with fungicide, even though they had been carefully pruned, since some pustules are almost certain to escape attention, and spores might moreover be carried by the wind from neighbouring gardens. It is most important to commence spraying early so as to prevent the fungus obtaining an entry into the leaves, as when once this has been effected the mycelium continues to grow between the tissues and the blotches inevitably follow. To keep the bushes absolutely clean it will,

* Since the above was written infected leaves which had remained green throughout the winter have been observed on various kinds of roses bearing abundant conidia. The collecting and burning of such leaves remains, therefore, a valuable control measure.

judging from the American experiments, probably be necessary to spray at intervals of about a month.

EXPLANATION OF PLATE VI.

Actinonema rosae. Portion of one-year old rose shoot "Juliet" in April, showing the winter infection of the stem.

XIX.—THE OIL PALM IN THE CAMEROONS.

The "Ergänzungsheft" No. 13 of "Mitteilungen aus den Deutschen Schutzgebieten," Berlin, 1917, is occupied by an exhaustive account of the grass highlands of the North-west Cameroons, by Kurt Hassert, illustrated by two maps and some plates of photographs. This, which is only the first part and consists of 144 pages, deals with the physical geography of the region and its plant formation. Under the heading useful wild plants, accounts are given of rubber, kola, cotton and oil palm.

The section dealing with the Oil Palm in the Cameroons (pp. 115-120), includes some information not previously published in this *Bulletin*. One of the maps shows the distribution of the different types of flora and in addition the localities where oil palm and kola are abundant are clearly indicated.

The oil-palm (*Elaeis guineensis*) occurs in the Cameroons principally in the lowlands occupied by primeval forest. Districts economically important for its produce near the coast are Duala, Jabassi, Edea and Rio del Rey, while further inland the territories of Bakundu, Kabo and Bangwa produce this palm in remarkable abundance. Extensive areas of grassy highlands are also rich in oil-palms, and the trees form a marked feature of declivities where a transition from grassland to forest takes place, the palms occurring in such quantity on the edge of the slope as to form woodlands.

Forest of nearly pure growth of oil-palm occupies large stretches of ground in various localities, e.g., on declivities of the Bambuto Range, and in valleys of the Mbo Mountains.

There is a striking paucity of oil-palms in the Southern highlands of Dschang, and this feature becomes more and more pronounced as one follows the grassland eastward.

The mode of occurrence of the palm varies greatly. Thus it grows wild or half-wild, and scattered as numerous isolated specimens in primary or secondary forest or on farmlands. It is also found forming groups in valleys and on slopes of mountains, or, as mentioned above, it may constitute almost pure palm-forest. Another mode of occurrence is as a dense zone around a village, being kept in this case in a state of semi-cultivation. The Banyang villages are encircled by oil-palms in this way.

Besides a high temperature, the special requirement of the tree is sufficient moisture, only scanty produce being yielded when the rainfall is less than 100 or 150 cm. The tree is fairly sensitive to drought, when the latter is somewhat prolonged; but otherwise it is relatively adaptable. Thus it not only grows in abundance in the forest-lowlands, which are warm and damp, being subject to much rain, but it also occurs on the grasslands

to a considerable elevation, still giving good crops in these situations. The upper limit of its growth may be taken as usually between 1200 and 1300 metres. On the Bana highlands, however, it reaches 1450 metres, and bears plenty of fruit, while in the Cameroon Range it ascends to 1000 metres, but the limit of its productiveness is attained there at about 700 metres.

The occurrence of the oil-palm is in many cases an indication of previous human occupation. It is one of the characteristic plants of the secondary forest, which has mostly grown up on the land of deserted farms or settlements.

The presence of oil-palms in undoubted primary forest is regarded as being due to the transport of the nuts by monkeys, birds, etc., while a good deal of dispersal on steep slopes is attributed to the action of rain-water.

The typical oil-palm which is so widely distributed in the Cameroons is called Dilombe or Dipobe, and its fruit contains a hard shell. A different variety (*E. guineensis* var. *microsperma*), which is known as Lisombe, differs in having a fruit with a thin shell, and is of only isolated occurrence; it never is gregarious and in some districts it does not occur at all.

Germany consumes more than half the world's commercial supply of the produce of oil-palms. Besides the imports from the Cameroons and Togoland, Germany obtains palm-oil and kernels to the value of about 100 million marks annually from British Nigeria, the amount of the same products exported from the Cameroons in 1912 being valued at 6 million marks.

Oil-fruits may well become the most important article of export from the Cameroons, since the oil-palm is much more abundant than was supposed some time ago. The difficulties and expense of transport at present prevent the quantities of fruit occurring in regions far from the coast from being utilised. Products of the oil-palm for export consequently come chiefly from river territories near the coast, e.g., Lower Sanaga, Wuri, Mungo, Rio del Rey and Cross River, that dispatched by the Cross River being taken for the most part over the frontier to the British coast-factories. It is to be expected that a future extension of the Northern Railway would make it possible to considerably increase the export of oil from the Cameroons.

The cultivation of the oil-palm in plantations is being continually advanced in regions near the coast. It has been estimated that about 200 plants can be planted on 1 hectare of well cleaned soil (i.e., 80 to the acre), but the number of palms to the hectare is supposed to average about 60 in the plantations of the Cameroon Mountains, and is stated to be 45 in the region of the Upper Cross River. An idea can be formed of the yield which might be expected from 1 hectare of plantation by assuming one tree to produce 30 to 40 kilos of fruit, this yield giving about 3 kilos of oil and the same weight of kernels.

The oil-palm is certainly one of the most important productions of the Cameroons, and will perhaps become more important than cotton, cocoa and rubber; indeed, palm-oil and palm-kernels have been described as the backbone of West African commerce.

XX.—A DISEASE OF THE YAM.

(Bagnisiopsis Dioscoreae.)

E. M. WAKEFIELD.

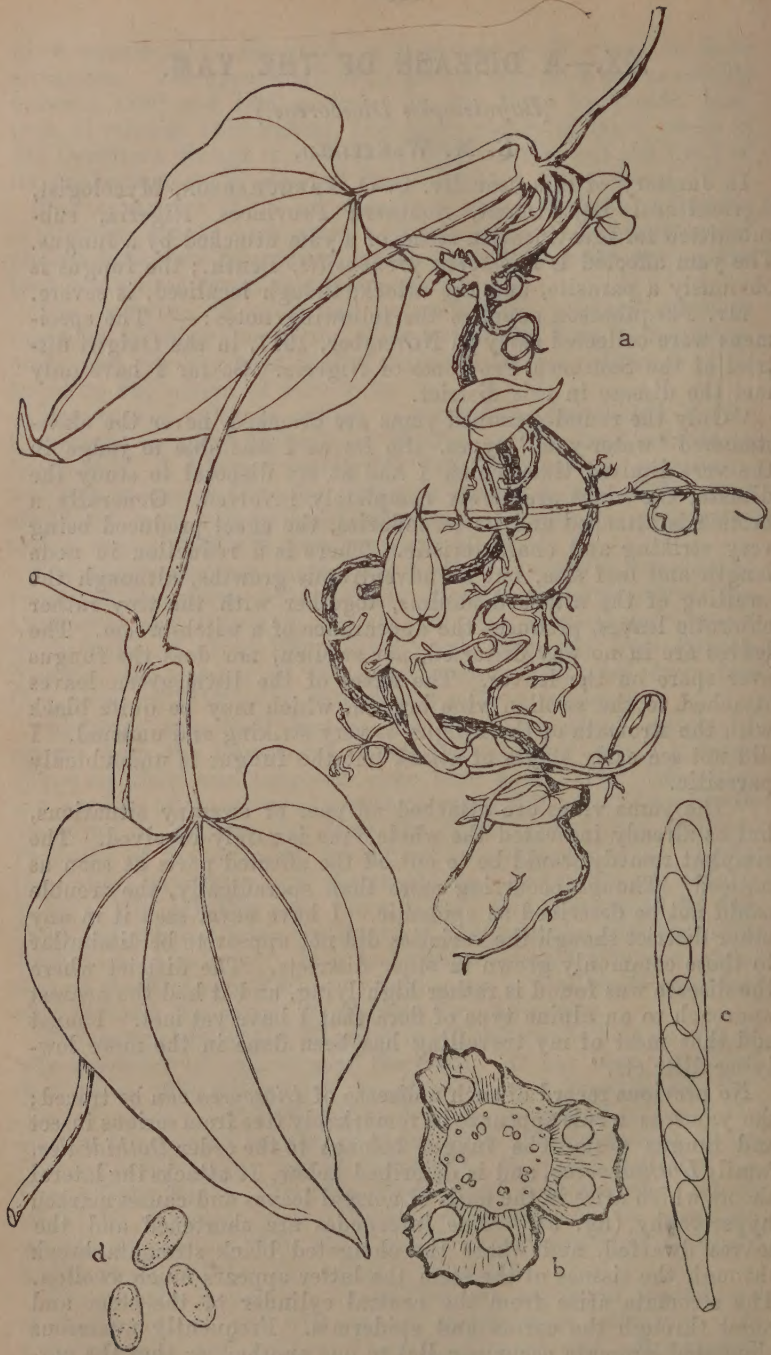
In January of this year Mr. C. O. FARQUHARSON, Mycologist, Agricultural Department, Southern Provinces, Nigeria, submitted for identification stems of a yam attacked by a fungus. The yam affected is *Dioscorea prehensilis*, Benth.; the fungus is obviously a parasite, and the attack, though localised, is severe.

Mr. Farquharson supplies the following notes:—"The specimens were collected early in November, 1917, in the Okigwi district of the Southern Provinces of Nigeria. So far I have only met the disease in this district.

"Only the round-stemmed yams are attacked, never the alate-stemmed 'water-yam' types. So far as I was able to judge in the very limited time which I had at my disposal to study the disease, the vines are rarely completely involved. Generally a branch is attacked and its secondaries, the effect produced being very striking and characteristic. There is a reduction in node length and leaf size, but no adventitious growths, although the swelling of the attacked haulms, together with the tiny rather chlorotic leaves, produces the appearance of a witch-broom. The leaves are in no way distorted, nor swollen, nor does the fungus ever spore on the leaves. The effect of the little green leaves attached to the swollen vine branch, which may be quite black with the stromata of the fungus, is very striking and unusual. I did not see early stages of attack but the fungus is undoubtedly parasitic.

"The yams vines are attacked on poor or swampy situations, but as already indicated the whole vine is rarely involved. The simplest remedy would be to cut off the affected parts as soon as noticed. Though occurring more than sporadically, the trouble could not be described as epidemic. I have never seen it in any other district though the varieties did not appear to be dissimilar to those commonly grown in other districts. The district where the disease was found is rather high lying, and it had the nearest approach to an alpine type of flora that I have yet met. I must add that most of my travelling has been done in the more low-lying districts."

No previous record of such a disease of *Dioscorea* can be traced; the yams as a rule appear to be remarkably free from serious insect and fungus pests. The fungus belongs to the order *Dothideales*, family *Dothideaceae*, and is described below. It attacks the lateral shoots which arise in the axils of normal leaves and causes marked hypertrophy (fig. a). The internodes are shortened and the leaves dwarfed, and where the elongated black stromata break through the tissues of the stem the latter appears much swollen. The stromata arise from the central cylinder of the stem and burst through the cortex and epidermis. Frequently numerous elongated stromata occur parallel to one another, so that the cortex is almost entirely replaced by fungus tissue. In such cases strips only of the torn cortex and epidermis remain between the



stromata (see fig. b), or in extreme cases the stromata may even coalesce entirely.

Under the hitherto generally accepted nomenclature of Saccardo's Sylloge the fungus would have been placed in the genus *Bagnisiella*, Speg., which was distinguished from *Phyllachora* by the pulvinate, erumpent stroma. Theissen and Sydow* have shown, however, that the type of the genus *Bagnisiella*, *B. australis*, Speg., differs from true *Dothideales* in having, in place of true loculi, a "kontinuierliche Fruchtschicht," thus suggesting relationship with the Discomycetes. They therefore confine *Bagnisiella* to this species, excluding it from the *Dothideales*, and constitute two new genera, *Bagnisiopsis* (with paraphyses) and *Amerodothis* (without paraphyses), for the true *Dothideales* with hyaline continuous spores and erumpent stromata which were previously referred to *Bagnisiella*. The fungus described below possesses paraphyses, and appears to be a new species of *Bagnisiopsis*.

***Bagnisiopsis* Dioscoreae, Wakefield.**

Stromata erumpentia, sublineare-elongata, pulvinata, superficie ob loculos prominulos rugosa, atra, 1 mm. diametro, contextu pseudoparenchymatico. *Loculi* numerosi, globosi, ad 500 μ diametro. *Asci* cylindrici, apice rotundati, brevissime stipitati, octospori, 120-135 \times 12-15 μ . *Paraphyses* filiformes, 2.5-3 μ diametro, ascos aequantes. *Sporae* monostichae, oblongae, utrinque obtusae, hyalinae, interdum polari-guttulatae, 17-18 \times 7.8-5 μ .

NIGERIA. Southern Provinces: Okigwi district; on stems and petioles of *Dioscorea prehensilis*, Benth., C. O. Farquharson, Nov. 1917.

The same fungus has also been found on another specimen of *D. prehensilis*, collected by Mr. and Mrs. P. A. Talbot at Oban, South Nigeria, in 1911 (Talbot, 726 in *Herb. Kew*).

EXPLANATION OF FIGURES.

- a. Portion of *Dioscorea* plant showing hypertrophied lateral shoot with stromata of *Bagnisiopsis Dioscoreae* (nat. size).
- b. Transverse section of stem from hypertrophied shoot, showing three stromata of *Bagnisiopsis* arising from the central vascular cylinder; the dotted regions between the stromata represent cortex (\times about 12, diagrammatic).
- c. Ascus of *B. Dioscoreae* (\times 550).
- d. Spores (\times 550).

* Theissen, F., and Sydow, H. Die Dothideales, in *Ann. Myc.* xiii. 1915, pp. 651-652.

XXI.—DIAGNOSES AFRICANAE: LXXI.

1621. *Raphidiocystis ugandensis*, Rolfe [Cucurbitaceae]; a *R. Welwitschii*, Hook. f., foliis repando-lobatis et fructibus ovoideis griseo-villosis (nec rufo-villosis) differt.

Caules subgraciles, angulati, pubescentes, longe scandentes. *Folia* late cordato-ovata, subobtusata, 7-nervia, 8-12 cm. longa, 4-9 cm. lata, supra sparse strigosa et crebre lenticellata, venis copiose strigosis, subtus pubescentia, margine in sinu dente acuto instructa; petioli pubescentes, 1.5-4 cm. longi. *Flores* masculi haud visi; flores feminei axillares, solitarii, pedunculati; pedunculi pubescentes, circiter 1.5 cm. longi; ovarium ovoideum, copiose griseo-villosum, circiter 1.5 cm. longum. *Calycis* segmenta triangulari-subulata, 2 mm. longa. *Corolla* tubulosa, prominenter striato-venosa, 1 cm. longa, tubo lato 0.6-0.7 cm. longo, lobis rotundo-ovatis 4-5 mm. longis. *Stigmata* lobata, 1 cm. longa. *Fructus* immaturus circiter 3 cm. longus.

TROPICAL AFRICA. Uganda: Mabiri Forest, savannah near Naminyama, 1220 m., October, 1916, *R. Dummer* 2991. Flowers reddish.

1622. *Salvadora angustifolia*, Turrill [Salvadoraceae]; affinis *S. oleoidi*, Dene, sed foliis 3-5-nervatis, squamulis interstaminalibus majoribus distinguenda.

Frutex ramosus, caulibus cylindricis glabris, interdum glaucescentibus. *Folia* linearia, saepe plus minusve falcata, apice acuta, basi in petiolum gradatim angustata, usque ad 10 cm. longa, saepissime 6-7 mm. sed interdum usque ad 1.3 cm. lata, margine integra. *Inflorescentia* axillaris vel terminalis, multiflora, ramosa, ramis glabris, floribus fere sessilibus; bractee minutae, vix 1 mm. longae, triangulares, apice acutae. *Calyx* 4-lobus, 1-2 mm. longus, lobis obovatis apice rotundatis. *Corolla* alba, petalis 4 a basi connatis elliptico-obovatis circiter 2-3 mm. longis et 1.25 mm. latis apice rotundatis. *Stamina* 4, filamentis 1.25 mm. longis, antheris 0.75 mm. longis. *Squamellae* 4, staminibus alternae, triangulares, apice plus minusve truncatae, 0.25 mm. longae. *Ovarium* late pyriforme, 1 mm. altum, fere 1 mm. diametro, uniovulatum; stigma sessile. *Drupa* immatura ovoideo-pyriformis.

MASCARENE ISLANDS. Madagascar: Tulear, *P. A. Methuen*; St. Augustin's Bay, *Bouton*; *Admiral Bowles*; without precise locality, *Grevé*. Aldabra Group, *Dupont*, 15; Cosmoledo, *Fox*, 289.

According to *Fox* the local name of this plant in Cosmoledo is Tambalocoque.

1623. *Apterantha*, *C. H. Wright* [Amarantaceae]; gen. nov. ex affinitate *Pleuropteranthae*, Franch., a qua perianthii segmentis aequalibus 1-nerviis differt; a *Digera*, Forsk., utriculo circumscissili distinguitur.

Flores hermaphroditi. *Perianthii* segmenta aequalia, scariosa, 1-nervia, imbricata. *Stamina* 5, perianthio breviora; filamenta

basi cupulatum connata; antherae oblongae, 2-loculares. *Staminodia* 0. *Ovarium* sessile, subglobosum; stylus fere ad basin 2-partitus; stigmata linearia. *Utriculus* membranaceus, prope basin circumscissilis. *Semen* erectum, a latere compressum; testa crustacea; embryo annularis; endospermium copiosum, farinosum.—*Planta* herbacea vel sublignosa, erecta. *Folia* alterna, simplicia. *Cymae* breves in spicas terminales elongatas dispositae. *Species unica.*

A. oligomeroides, C. H. Wright. *Planta* ramosa, erecta, herbacea vel sublignosa, glabra, 24 cm. alta. *Folia* alterna, indivisa, anguste lanceolata vel spathulata, acuta vel acuminata, basi angustata, ad 4 cm. longa et 5 mm. lata. *Spicae* plures, terminales, multiflorae, 4-8 cm. longae, simplices vel pauciramosae; bracteolae ovatae, concavae, scariosae, perianthio breviores. *Perianthii* segmenta 2, aequalia, scariosa, oblonga, 1 mm. longa, acuta, 1-nervia. *Stamina* 0.75 mm. longa; filamenta subulata, basi in cupulam brevem connata; antherae oblongae, filamentis breviores, 2-loculares. *Staminodia* nulla. *Ovarium* sessile, subglobosum; stylus fere ad basin 2-partitus, ramis latere interiore stigmaticis. *Utriculus* vix 1 mm. longus, membranaceus, hyalinus, a latere compressus. *Semen* erectum, lenticulare, utriculo conforme; testa nigra.

MASCARENE ISLANDS. Aldabra, Dupont, 56; Thomasset, 237.

1624. **Loranthus aldabrensis**, Turrill [Loranthaceae]; affinis *L. Baroni*, Baker et *L. clavato*, Desr., ab hoc floribus saepissime majoribus, calyce fere truncato lobis latioribus et minus prominentibus, ab illo limbo corollae in alabastro ob margines prominulos quasi 5-carinato vel fere 5-alato, bracteis cupularibus haud gibbosis distinguitur.

Planta glabra, ramosa, ramis teretibus griseo-brunneis densiuscule lenticellatis. *Folia* opposita, petiolata, oblongo-elliptica, saepissime 5-8 cm. longa et 2.3-5 cm. lata, coriacea, penninervia, nervis pagina superiore saepe prominentibus pagina inferiore inconspicuis lateralibus obliquis; petiolus 0.5-0.75 mm. longus. *Fasciculi* axillares, 1-3-flori; pedicelli 4 mm. longi; bractea asymmetricè cupularis, oblique truncata vel interdum altero latere in lobum acutum producta, leviter ciliata. *Flores* pentameri. *Torus* cum calyce oblongus vel oblongo-obconicus, 5 mm. longus, 2 mm. diametro. *Calyx* cupularis, fere truncatus, 1 mm. longus, lobis saepissime inconspicuis et irregularibus usque ad 2 mm. latis margine leviter ciliatis. *Corolla* matura 4 cm. longa, limbo in alabastro oblongo-ellipsoideo ob margines prominulos quasi 5-carinato vel fere 5-alato; tubus gracilis, subpentagonus, basi haud inflatus, unilateraliter fissus (?); lobi 7-8 mm. longi, 1 mm. lati, lineari-lanceolati, subacuti. *Filamenta* basi corollae loborum inserta, erecta, 1.5 mm. longa; antherae lineares, 4 mm. longae, haud transverse septatae. *Discus* inconspicuus. *Stylus* filiformis, stigmate capitato 0.75 mm. longo.

MASCARENE ISLANDS. Aldabra, H. P. Thomasset, 229; J. C. F. Fryer, 8; Dupont, 10. W. Fox, 241, with young fruit only, and

Dupont, 107, without flowers or fruit, probably belong to this species.

1625. **Phyllanthus Cheloniphorbe**, *Hutchinson* [Euphorbiaceae-Phyllanthaeae]; affinis *P. anomalo*, Muell.-Arg., sed foliis apice rotundatis pedicellis ♂ multo brevioribus differt.

Arbor parva, ligno molli (*Dupont*); ramuli tortuosi, cinerei vel purpurascetes, hornotini glaucescentes, glabri. *Folia* obovata vel obovato-elliptica, apice rotundata, basin versus sensim attenuata, 2.5-9 cm. longa, 1.5-4.5 cm. lata, primum tenuiter demum firme chartacea, integra, sicco cinereo- vel flavo-viridia, distincte nervosa sed obscure reticulata, glabra; costa plerumque straminea, supra sulcata, infra prominens; nervi laterales utrinsecus 8-9, a costa sub angulo lato abeuntes, utrinque prominuli; petioli 4-8 mm. longi, rugulosi, glabri. *Flores* dioici, axillares, ♂ dense fasciculati, breviter pedicellati, ♀ paucifasciculati vel rare subsolitarii. *Flores* ♂: pedicelli usque ad 4 mm. longi, glabri; bracteae exteriores coriaceae, suborbiculares, ad 3 mm. diametro, interiores oblongae, apice rotundatae, subhyalinae; sepala 4, oblongo-elliptica, 2.5 mm. longa, 1.5 mm. lata, glabra; disci glandulae transverse oblongo-ellipsoideae, discretae sed fere contiguae; filamenta libera, 1.5 mm. longa; antherae oblongae, 1 mm. longae, longitudinaliter dehiscentes. *Flores* ♀: pedicelli usque ad (in fructu) 1.5 cm. longi, apicem versus leviter incrassati, angulares; sepala 4, inaequalia, late ovata vel oblongo-ovata, apice rotundata, dorso carinata, 2-2.5 mm. longa, marginem versus hyalino-membranacea; discus patelliformis, obscure crenulatus; ovarium ampulliforme, glabrum, stigmatibus subsessilibus 4 reflexis subulato-lanceolatis carnosius cronatum. *Fructus* dicoccus, ambitu subglobosus, 6-7 mm. diametro, glaber. *Semina* triquetra, laevia, dorso convexa, lateralibus fere plana, brunnae, 4 mm. longa, 3 mm. lata.

MASCARENE ISLANDS. Aldabra, *W. L. Abbott*; *H. P. Thomasset*; *Dupont* 66, 112, 116; *Fryer* 17, 35, 87.

According to *Dupont* this is a small tree with a soft wood, the leaves of which are eaten by tortoises.

1626. **Cluytiandra peltata**, *Hutchinson* [Euphorbiaceae-Phyllanthaeae]; inter species adhuc descriptas foliis peltatis distinctissima.

Frutex ramosus; ramuli laxè foliati; cinereo-virides, compresso-angulati, glabri. *Folia* longe petiolata, peltata, ovata vel ovato-lanceolata, subacuta, basi rotundata, 2-4 cm. longa, 1-2 cm. lata, tenuiter chartacea vel fere membranacea, glabra; nervi laterales utrinsecus 7-8, a costa sub angulo lato abeuntes, utrinque prominuli; petiolus supra basin laminae 1.5 mm. insertus, 0.5-2 cm. longus, gracilis, glaber; stipulae lanceolatae, acutae, 1.75-2 mm. longae, glabrae. *Flores* monoici, axillares, solitarii, ♂ breviter, ♀ demum longissime pedicellati. *Flores* ♂: pedicelli filiformes, 4 mm. longi; sepala 5, oblongo-ovata, 1 mm. longa, viridia, glabra; discus patelliformis, crenulatus; stamina 5, filamentis fere liberis; ovarii rudimentum minutum, trilobulatum.

Flores ♀ : pedicelli-demum 3·5 cm. longi, filiformes, apicem versus leviter incrassati; sepala late ovata, sub fructu persistentia; capsula oblonga, 7 mm. longa, lobata, leviter verrucosa; semina matura non visa.

MADAGASCAR. Central districts, *Rev. R. Baron* 4198, 4231.

This is a very remarkable species of *Cluytiandra*, a genus not hitherto recorded outside the African continent. The peltate leaves distinguish it at once from all other African *Phyllanthaceae*.

1627. ***Cluytiandra Baronii***, *Hutchinson* [Euphorbiaceae-Phyllanthaceae]; species foliis magnis usque ad 9 cm. longis facile distinguitur.

Ramuli glabri, annotini angulati, cinerei vel purpurascentes. *Folia* elliptica vel oblongo-elliptica, basi rotundata, apice acute mucronata, 4·5-9 cm. longa, 2·5-5 cm. lata, tenuiter chartacea, supra viridia, infra glauca, margine (praecipue basin versus) recurvata; costa supra leviter impressa, infra prominens, straminea; nervi laterales utrinsecus 8—10, supra leviter impressi, infra prominuli, a costa sub angulo fere 90° abeuntes, prope marginem arcuati et conjuncti, venis laxis prominulis; petioli 0·5-1·2 cm. longi, glabri; stipulae caducae, squamiformes, nitidae. *Flores* ut videtur dioici, ♂ inracemos brevissimos dense bracteatos axillares dispositi; bractee stipuliformes, imbricatae; pedicelli filiformes, usque ad 1 cm. longi; sepala 5, suborbicularia, submembranacea, 1·75 mm. longa et lata, glabra; discus patelliformis, tenuis, integer; ovarii rudimentum crassum, subintegrum. *Flores* ♀ haud visi.

MADAGASCAR. Chiefly North-West Madagascar, *Rev. R. Baron* 5606, 5630.

1628. ***Acalypha claoxyloides***, *Hutchinson* [Euphorbiaceae-Crotonaceae]; inter species africanas foliis supra dense pustulatis infra glandulosis mox glabris, inflorescentiis lanato-tomentosis distincta.

Frutex ramulis vetustioribus cinerascentibus lenticellis corticatis notatis, junioribus minute pubescentibus mox glabratiss. *Folia* ovato-elliptica, basi rotundata, obtuse acuminata, 7-12 cm. longa, 3-6 cm. lata, subdupliciter crenata, basin versus subintegra, tenuiter chartacea, supra pustulata, primum infra glandulosa, mox glabra, laxe reticulata, siccio flavo-viridia; nervi laterales utrinsecus 5-6, a costa sub angulo 45°-60° abeuntes; petioli brunnei, 1-3 cm. longi, parce puberuli, mox glabrescentes. *Inflorescentia* bisexualis, floribus basalibus 2-3 ♀, vel interdum omnibus ♂, usque ad 2·5 cm. longis; bractae ♂ ovatae, subacutae, lanato-pubescentes, 1·25 mm. longae, ♀ biflorae, late reniformes, circiter 8 mm. latae, minute denticulatae, extra glandulosae et puberulae. *Calyx* ♀ trilobus, extra pubescens, lobis triangularibus subacutis. *Ovarium* dense glandulosum et parce pubescens; styli graciles, 2·5 mm. longi laciniati. *Fructus* haud visus. *Claoxylon* sp., Baker in Kew Bull. 1894, 150.

MASCARENE ISLANDS. Aldabra, Oct.-Dec., 1892, *W. L. Abbott*; *Fryer* 18. Astove, Cosmoledo and Aldabra, one of the commonest shrubs, Apr., 1907, *H. P. Thomasset*, 243.

1629. *Acalypha Fryeri*, *Hutchinson* [Euphorbiaceae-Crotonaeae]; affinis *A. fruticosae*, Forsk., sed foliis infra minus glandulosis haud pubescentibus et bracteis ♀ conspicuis differt.

Frutex ramulis annotinis strictis cinereis defoliatis, hornotinis brunneis parce pubescentibus et foliatis. *Folia* ovata vel ovato-lanceolata, basi rotundata vel subcuneata, apice obtusa, 2-4.5 cm. longa, 1.5-3 cm. lata, tenuiter chartacea, crenata, supra glabra, infra primum peltato-glandulosa, mox fere glabra, laxe reticulata; nervi laterales utrinsecus circiter 5, a costa sub angulo 45° abeuntes; petioli graciles, parce puberuli, usque ad 1 cm. longi. *Inflorescentia* bisexualis, graciliter pedunculata, usque ad 5.5 cm. longa, inferne floribus ♀ circiter 2 leviter superpositis, superne floribus ♂ breviter spicatis; bractae ♂ parvae, ovatae, pubescentes, ♀ reniformes, in fructu 1 cm. longae et 1.4 cm. latae, crenato-serratae, reticulatae, extra parce glandulosae biflorae. *Calyx* ♀ cupularis, 3-dentatus, 1.5 mm. longus, dentibus triangulari-subulatis acutis parce pubescentibus. *Ovarium* depressoglobosum, dense glandulosum et parce puberulum; styli graciles, 3 mm. longi, lobis lateralibus filiformibus 2 mm. longis. *Capsula* 3-5 mm. longa, glandulosa et pubescens. *Semina* 2.5 mm. longa.

MASCARENE ISLANDS. Aldabra, *Fryer* 92.

1630. *Widdringtonia dracomontana*, *Stapf* [Pinaceae]; a *W. cupressoidi*, Endl., differt valvis fructuum ubique rugosis, ovulis 3-nis cum quaque squama, seminibus minoribus utrinque aequaliter alatis magis minusve oblongis.

Arbor mediocris vel *frutex*, ramulis gracilibus. *Folia* plantae adultae squamiformia, ea ramulorum ultimi ordinis arcte adpressa, superne in dorso subtumida, oblonga vel obvato-oblonga, subacuta vel fere obtusa, ad medium adnata. *Coni* ♂ oblongi, 2 mm. longi, squamis circiter 12 subpeltatis rhombico-ovatis subcoriaceis. *Coni* ♀ breviter spicati, tempore pollinationis 4 mm. diametro squamis ovato-oblongis subobtusis medio longitudinaliter valde incrassatis; maturi 1 vel 2 per spicam, globosi vel ovoideo-globosi, 1.8-2 cm. diametro, nigrescentes. squamis demum rugosis infra apicem tuberculo conico munitis. *Ovula* 3 cum quaque squama. *Semina* leviter compressa, oblonga vel lanceolato-vel ovato-oblonga, circiter 7 mm. longa, 3 mm. lata, atro-fusca, aequaliter alata, alis apice in excisura confluentibus, ad 2 mm. vel paulo ultra latis. *W. cupressoides*, Sim, For. Fl. Cape Col. 337 (pro parte); Bews in Ann. Natal Mus. iii. 549; non Endl. *Callitris cupressoides*, Wood, Handb. Fl. Natal, 122, and in Trans. S. Afr. Phil. Soc., xviii. 122, 224; non Schrad. *C. natalensis*, Endl. ex Fourcades, Rep. Natal For. 1889, 16, 121.

SOUTH AFRICA. Natal: Weenen District, Drakensbergen, headwaters of the Bushman's River (Langalibelele's Location), *Fannin* (*Sanderson*, 2011); between Cathkin and Mont aux

Sources, forming isolated woods or clumps at high altitudes, *Fourcades*.

Widdrington natalensis, Endl. Syn. Con. 34, very imperfectly described from specimens said to have been sent by Gueinzus and Krauss from "Port Natal," is very likely *W. cupressoides* from the Cape of Good Hope.

XXII.—FUNGI EXOTICI: XXIV.

In the present contribution nine species which appear to be new to science are described. One, *Fomes pseudo-ferreus*, is the cause of a serious root disease of *Hevea brasiliensis* in the Federated Malay States. This disease was originally attributed to *Poria hypolateritia*,* but material received at Kew shows that the fungus is a pileate species, and apparently an undescribed species of *Fomes*. Unfortunately the material available is imperfect, and perfect sporophores appear to be rarely formed. It has been judged advisable, nevertheless, to give the species a name for convenience of reference.

Fomes elegans was said to be found on living *Shorea robusta* but is not recorded as causing any great injury. Except for *Cercospora latimaculans* and *Puccinia Coreopsidis* the other species recorded are saprophytes.

Fomes elegans, Wakefield.

Pileus sessilis, tenuis, conchatus, postice decurrens, 4.6 × 2.5-3.5 cm., brunneo-griseus, zonis fusco-badiis concentricis notatus, demum rimosus rugulosusque, hymenio pallido concavo. *Contextus* aurantio-brunneus, 3-4 mm. crassus. *Tubuli* vix pallidiores, intus albido-farcti, 1-1.5 mm. longi. *Pori* minuti, tactu velutini, pallide roseo-cinnamonei. *Setulae* nullae. *Sporae* ex hyalino fulvescentes, late ellipticae vel subglobosae, 5 × 4.4-5 μ .

INDIA. Singhbhum, on living *Shorea robusta* (the Sal), R. S. Hole (1916).

This is a small, neat species, with marked characters. The upper surface of the pileus when young recalls strongly-zoned specimens of *Polyporus licnoides*, while the pores in colour and softness to the touch resemble those of *Fomes dochmii*. The species differs from *F. dochmii* in the concave hymenium and in the bright orange-brown flesh. The colour of the latter is that of Ridgway's "Sanford's brown," while the colour of the pore-mouths is nearest to "light pinkish cinnamon." The pileus is thin for a *Fomes*, but shows stratification, each season's growth being about 5 mm. in thickness.

* Belgrave, W. N. C. Root Disease of Plantation Rubber in Malaya; in Ag. Bull. Fed. Malay States iv. 1916, p. 11.

Fomes pseudo-ferreus, Wakefield.

Pileus sessilis, dimidiatus, unguatus vel irregulariter undulato-applanatus, subinde imbricatus, glaber, azonatus, cute rigida sicco rimosa e ferrugineo fusco-umbrina tectus, margine sterili tumido albido. *Contextus* floccosus, e cinnamomeo umbrinus. *Tubuli* concolores, intus albidi. *Pori* minuti, rotundati, crasse tunicati, albidi, tactu flavescentes. *Sporae* non visae.

FEDERATED MALAY STATES. On diseased *Hevea brasiliensis* roots, W. N. C. Belgrave (1917).

The fungus is said to cause a root disease of *Hevea*. Unfortunately mature sporophores are very rare, and the only one available, from which the above description has been drawn up, is ill-formed and shows no spores. When properly developed fructifications are obtained the description will no doubt have to be revised, but as the species does not appear to agree with any known form, and some means of designation is necessary, it has been thought advisable to name it. The very young sporophores, both in nature and as obtained in pure culture, strongly suggest a *Ganoderma*. One of the cultures, however, was said to have been obtained from hyaline spores derived from a resupinate fructification, hence the plant cannot belong to this genus. The mature pileus bears a distinct resemblance, as regards colour and texture, to that of *Fomes ferreus*, but it differs from that species in the white pore-mouths and darker flesh.

Aleurodiscus australiensis, Wakefield.

Sporophora primo irregulariter rotundata, demum late confluentia, hymenio roseo sicco alutaceo sub lente pulverulento, margine albido undulato secedente. *Basidia* juvenilia clavata, intus roseo-oleosoguttulatae, $60-70 \times 20 \mu$; basidia matura jam collapsa. *Pseudophyses* undulatae vel submoniliformes, apice obtusae, $50-80 \times 7-8 \mu$. *Dendrophyses* cylindricae, apice obtusae, superne aculeatae, $50-60 \times 7-8 \mu$. *Sporae* hyalinae, ellipsoideae, $50-60 \times 7-8 \mu$. *Hyphae* basales arcte, subhymeniales laxe intertextae, septatae ad septa nodosae, 2.5μ diametro.



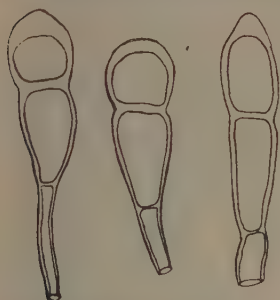
1. Spores. 2. Portion of hymenium showing a. Young basidium, b. Pseudophysis, c. Dendrophysis ($\times 550$).

AUSTRALIA. Queensland, on a dead branch, C. T. White (1912).

In habit this species resembles *A. javanicus*, P. Henn., but it differs in the rough spores, and in the presence of wavy or moniliform paraphyses (Pseudophyses) in addition to the aculeate paraphyses (Dendrophyses).

Puccinia Coreopsisidis, Wakefield.

Maculae griseae, suborbiculares, 3-4 mm. diametro, definite limitatae, atro-marginatae. *Teleutosori* hypophylli, plus minus concentrice dispositi, aggregati confluentesque, circa 0.5 mm. diametro, diutius epidermide tecti, demum erumpentes, spadicei. *Teleutosporae* pallide fulvescentes, variabiles, clavatae, medio constrictae, apice rotundatae, ad 7 μ incrassatae, loculo superiore subgloboso vel elliptico 18-30 \times 16-20 μ , loculo inferiore cylindrico vel clavato 28-35 \times 10-18 μ ; pedicellus fulvus, 10-35 \times 5-7 μ .

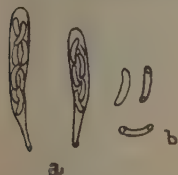


Teleutospores ($\times 550$).

TROPICAL AFRICA. Uganda, on *Coreopsis* leaves, R. Dummer 1113 (1914).

Eutypella theobromicola, Wakefield.

Stromata elongata, per fissa erumpentia, circa 6 mm. longa, atra. *Perithecia* in quoque stromate dense aggregata, 0.25 mm. diametro, collis 6-sulcatis 0.5 mm. longis. *Asci* clavati, 22-25 \times 3.5-4 μ , octospori. *Sporae* subdistichae, elongatae, curvulae, pallide olivaceae, 6-7 \times 1-1.5 μ .



a. Asci.

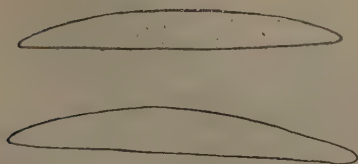
b. Spores ($\times 850$).

TROPICAL AFRICA. Gold Coast; Koshea, on *Theobroma Cacao* stems, A. C. Miles (Dec. 1915).

Rosellinia asperata, Mass. MS. in Herb. Kew.

Subiculum late effusum, pannoso-crustaceum, fusco-brunneum. *Perithecia* conoidea, 0.75-1 mm. diametro, 1 mm. alta, subiculo primo tecta, dein semi-immersa, villosa-aspera, ostiolo conico atro-nitente. *Asci* jam absorpti. *Sporae* fuscae, fusiformes vel cymbiformes, rectae, utrinque acutae, 50-60 \times 7.5-8 μ .

GOLD COAST. Aburi, on rotten wood, Botanic Gardens, W. H. Johnson, 178 (1900).



Spores ($\times 850$).

This species resembles in habit *R. bothrina*, B & Br., and *R. arcuata*, Petch, but differs in the larger spores. No mucous envelope can be observed in the spores of the type specimen which, however, is obviously old and not in the best condition.

Septoria Coffeae, Wakefield.

Pycnidia sparsa, globosa, 50-70 μ diametro, pariete pseudo-parenchymatico, ostiolo pertuso. *Conidiophora* non visa. *Conidia* olivacea, cylindrica vel subfusiformia, curvula, 3-4 septata, 20-25 \times 3 μ .

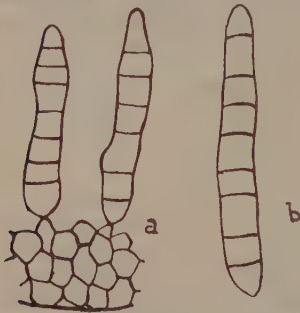


TROPICAL AFRICA. Uganda, on the torn parts of coffee leaves damaged by hail, W. Small 480.

Conidia (\times 850).

Hendersonia Protearum, Wakefield.

Maculae nullae. *Pycnidia* amphigena, sparsa vel aggregata, immersa, globosa, 140-290 μ diametro, contextu parenchymatico obscure brunneo crassiusculo, ostiolo minuto papillato pertusa.



a. Portion of pycnidial wall with two conidia in situ.

b. Mature conidium (\times 850).

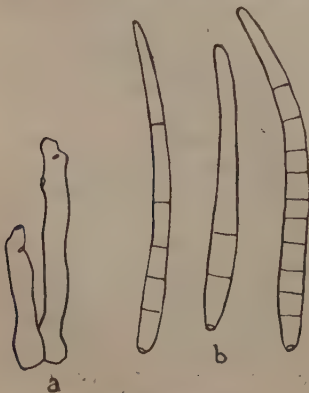
Conidiophora brevissima, papilliformia. *Conidia* ubique in pycnidio oriunda, obscure brunnea, 3-7 (rarius-8) septata, curvula, utrinque attenuata vel elongato-obelavata, 25-52 \times 6-8 μ , maturitate copiose emergentia et matrice inquinantia.

TROPICAL AFRICA. Uganda, on dead *Protea madiensis* leaves, R. Dummer 2866 (July, 1916).

Remarkable for the very large spores, which when exuded form a black crust on the leaf for some distance round the ostioles.

Cercospora latimaculans, Wakefield.

Maculae utrinque visibiles, irregulares, angulosae, primo 2-3 mm. diametro, sed demum late confluentes, pallide brunneae, centro arecentes, margine purpureo-brunneo. *Acervuli* epiphylli, sparsi, punctiformes, atri. *Conidiophora* simplicia, continua, erecta, leviter flexuosa, caespitosa, fusca, 25-40 \times 4-4.5 μ .



a. Conidiophores.

b. Conidia (\times 850).

Conidia elongato-obelavata, sursum paulatim attenuata, basi rotundata, leviter curvula, olivaceo-fusca, guttulata, 5-11-septata, ad septa non constricta, 30-65 \times 2-5 μ .

TROPICAL AFRICA. Gold Coast; Aburi, on *Bauhinia* leaves, R. H. Bunting 93 (Mar. 1917).

This species differs from *C. Bauhiniae*, Syd., in the larger confluent spots, in the acervuli occurring on the upper surface of the leaf only, and in the longer conidiophores and darker and more septate conidia.

XXIII.—A NEW MECONOPSIS FROM YUNNAN.

D. PRAIN.

In an interesting letter to Kew, dated 30th October, 1917, Mr. George Forrest has enclosed for identification two specimens of *Meconopsis*, representing the only two species found during the season 1917, that are novelties to him.

Regarding one of the two the letter, which is written from the Upper Mekong in North-west Yunnan, says:—"The species in fruit of which I can send only a portion was collected by my man whilst securing seed of *M. speciosa*, and it may prove only a form of that species." As neither flowers nor leaves are present it is not possible yet to identify the plant. The material sent shows that the species is a member of the group *Aculeatae* (*K.B.* 1915, p. 144). The capsules show, however, that it is not *M. aculeata*, Royle, *M. latifolia*, Prain, or *M. sinuata*, Prain, and that it is neither *M. horridula*, Hook. f. & Thoms., nor *M. rudis*, Prain. The capsules are like those of *M. Prattii*, Prain, but this latter species has not so far been collected in the region to which *M. speciosa*, Prain, appears to be confined; comparison with the capsules of *M. speciosa* is impossible, as the ripe fruits of that species are not yet known.

It may be remarked incidentally that in the letter under notice, Mr. Forrest announces the rediscovery of a *Meconopsis* (his n. 13169) first met with by him in 1914. The specimens of that gathering are in fruit only and the capsules are not distinguishable from those of *M. integrifolia*. Mr. Forrest alludes to it now as "a smaller plant in every way than the type *M. integrifolia*, with all parts, especially the capsule, heavily clothed with long, shining, straw-coloured bristly hairs. The flowers are white, smaller than *M. integrifolia*. It is apparently a rare form, for I only saw a few specimens of it in one locality, on the Hom-pu Shan, which is a spur of the Bei-ma Shan, both being portions of the Mekong-Yangtze divide in Lat. 28° 12' N.; very exposed rocky situation at approximately 14,000 ft." No plants raised from the 1914 seed of this plant have been reported at Kew. It is to be hoped that greater success may attend the seeds collected in 1917.

Mr. Forrest, in this letter, further states that "*M. integrifolia*, as seen on the Bei-ma Shan differs materially from the type found in the other ranges to the south and west in this province. The plants are taller, flowers larger, borne on stouter stems, the inflorescence almost apical, seldom branched from mid-stem, never from the base. The capsules are much larger and narrower and almost devoid of hairs." Growers of *Meconopsis* will look forward with interest to the results of sowing the seeds of this Bei-ma Shan plant. The old problem, with regard to the differences between the true *M. integrifolia*, Franch., and the very distinct species, which in externals so closely resembles *M. integrifolia*, first raised from seed secured by Captain Koslov in Kham, will suggest itself to those interested, as Mr. Forrest is, in this genus. Among the species of which seeds have been

obtained during 1917, Mr. Forest mentions, in addition to those already noted by him, *M. Henrici*, Bur. & Franch., and *M. lancifolia*, Franch.; he also alludes to a form allied to *M. lancifolia* and adds the interesting remark:—"so far I have not found *M. rudis* in this area."

The most interesting, from the botanical and distributional standpoint, of the species alluded to in this letter, is that represented by the second specimen—a flowering one—therein enclosed. The species it represents, besides being new to Mr. Forest, is new to the genus. It belongs to the section *Eumeconopsis*, in all the species of which any hairs that may be present are simple, not barbellate. Within that section its place is in the group *Cumminsia* (*K.B.* 1915, p. 142), and in that group it stands intermediate between *M. lyrata*, Fedde, a rare Sikkim plant and *M. polygonoides*, Prain, an equally rare plant from Chumbi, resembling the former very closely as regards its foliage and being at first sight hardly distinguishable from the latter as regards its flowers. It agrees with both these Himalayan species in the colour of its petals, but differs from them both in having half as many more stamens—24 in place of 16. Ripe capsules not being yet available, neither these nor the seeds can be described. The material supplied is, however, otherwise adequate for purposes of diagnosis, and the necessary formal account of the species is appended. Its place in the group to which it belongs will be most readily appreciated from the modification required in that portion of the 'Key to the known species of *Meconopsis*' (*K.B.* 1915, p. 137 et seq.) relating to *Cumminsia*, which the existence of this plant involves (l.c. p. 138).

Flowers blue or purple; leaves hirsute:—

Leaves hastate entire, or lyrate-pinnatifid:—

Petals ovate, rounded or rarely acute, fimbriate; stamens 16 4. *lyrata*.

Petals ovate-lanceolate, acute, entire; stamens 24 ... / 4a. *compta*.

Leaves ovate-lanceolate, more or less incised-crenate:—

Petals ovate-lanceolate, acute; stamens 16 5. *polygonoides*.

Petals rounded, obtuse; stamens 64 ... 6. *betonicifolia*.

Meconopsis compta, Prain; species e grege *Cumminsia* nuncupato inter *M. lyratam*, Fedde, et *M. polygonoidem*, Prain, quoad folia quasi mediana ab ambabus tamen staminibus 24 nec 16 facillime distinguenda.

Herba perennans, inermis. *Rhizoma* anguste ovoideum, oblique descendens, 1.5 cm. longum, 0.5 cm. latum. *Folia* plerumque radicalia vel prope basin et secus trientem imum scapi disposita, oblonga et lyrato-pinnatifida, apice obtusa, basi late cuneata vel fere truncata ibique abrupte in petiolum anguste alatum basi caulem amplectentem abeuntia, supra saturate

viridia, subtus glaucescentia, utrinque sparse hirsuta, 2.2-5 cm. longa, 1.1-5 cm. lata; petiolus 2.5-3 cm. longus. *Scapus* centralis, 8-22 cm. altus, parce hirsutus, florem terminalem suberectum suffulciens scapis axillaribus subbasalibus simplicibus 1-floris additis. *Sepala* 2, anguste ovata, extra parce hirsuta, 0.8 cm. longa. *Petala* 4, ovato-lanceolata, apice rotundato in acumen abbreviatum acutata, 2 cm. longa, 1 cm. lata, pallide coerulea. *Stamina* 24 filamentis coeruleis; antherae aurantiacae. *Ovarium* anguste ovoideum, glabrum; stylus perbrevis; stigma capitatum lobis decurrentibus contiguis.

SOUTH-EASTERN TIBET: Sarong; in open stony pastures on Ka-gwr-pu, on the Mekong-Salwin Divide, Lat. 28° 25' N., at altitudes of 3600-3900 m., *Forrest* 14306 (July, 1917)!

XXIV.—MISCELLANEOUS NOTES.

EDWARD BENBOW, CAPT.—We record with regret the death of Captain E. Benbow, M.C., R.A.F., only son of Mr. J. Benbow, head gardener of the celebrated gardens at La Mortola, Italy, who was killed on May 30, 1918, while contending single-handedly against four or five enemy aeroplanes.

Captain Benbow joined the army in September, 1914, and after obtaining a commission in the Royal Artillery transferred to the Royal Flying Corps, where he gained the reputation of a brave and intrepid airman.

R. H. PEARSON.—The widespread sorrow occasioned by the death of Mr. Robert Hooper Pearson, the Managing Editor of the *Gardeners' Chronicle*, which took place on June 11, is shared by his many friends at Kew where, about thirty years ago, he was a member of the gardening staff. Born at Brewood in Staffordshire on July 18, 1866, Pearson came to Kew in 1889 and was soon promoted to a sub-foremanship. Leaving in March, 1890, he entered the gardens of the Marquis of Bute at Cardiff Castle, and afterwards spent some time in the gardens at Patshull Hall, Staffordshire. In 1892 he was invited by Dr. M. T. Masters, then Editor of the *Gardeners' Chronicle*, to join his staff. He became Assistant-editor, and about ten years ago was appointed Managing Editor. Though ardently devoted to his main work he found time for other activities in connection with horticultural interests, and in addition to contributing articles to other papers he wrote a useful little book on Garden Pests and edited the several excellent volumes forming the Present Day Gardening series. In 1911 he was President of the Kew Guild and an appreciative notice of him, with portrait, appeared in the Guild Journal for 1909-10. The *Gardeners' Chronicle*, 1917, vol. lxi, p. 214, and 1918, vol. lxxiii, pp. 246 and 256, gives further particulars of Mr. Pearson's life and work and expresses the great affection and esteem with which he was regarded by his colleagues and friends.

EDWARD ALEXANDER NEWELL ARBER.—The untimely death at Cambridge on June 14th, 1918, of Dr. E. A. Newell Arber, at the age of 47, has been a source of deep regret to his friends at Kew. Although the bulk of his work has been concerned with systematic palaeontological study and thus did not bring him directly in contact with the work of Kew, his interests were by no means confined to that particular field, but led him, in one direction, to the presentation of a reasoned conception as to the origin of flowering plants; in another, to the preparation of an account of the natural history of alpine plants. In both of these activities Kew has been under obligations to Dr. Arber and those here who knew him are the poorer for the loss of his friendship.

Hibiscus cannabinus in Nigeria.—This is the most important species of *Hibiscus* grown for the production of fibre on a commercial scale. It is cultivated in India, the Madras Presidency being the centre of the trade; in Java; the Philippines; Persia; Nigeria; French Senegal, &c. The fibre has been dealt with as "Ambari" or "Ambasi," "Deccan," "Indian" or "Kanaff" (Caspian Sea) Hemp, "Hemp-leaved *Hibiscus*," "Bastard Jute" and "Bimlipatam Jute" in *Kew Bull.* Add. Series ii. "Vegetable Fibres," 1901, pp. 9-11 and Add. Series ix. 1908, pp. 70-71. In the last mentioned issue, "Ramma" or "Rama" (Hausa) is attributed only to *Hibiscus lunariifolius*, Willd., but on specimens in the Herbarium (Dalziel, Nos. 63, 425) since received at Kew from Northern Nigeria the particulars given go to show that *Hibiscus cannabinus*, Linn., is the commonly cultivated "Rama" of Nigeria; in Katagum it is cultivated near huts for fibre. A specimen collected by Higginson, Lagos, gives the same native name and a specimen of *H. lunariifolius* (Foster, Lagos) called "Ramo" or "Yemoro" also indicates that the same native name may apply to more than one species. "Wild Rama" has been applied to *H. asper*, a species described in *Kew Bull.* 1913, p. 418.

As well as being an important cultivated plant in Nigeria, *H. cannabinus* is cultivated on the banks of the Niger and the Bani by the Somono people.* The fibre is only produced for local use, but it is suggested that if the cultivation were increased the exportation of the fibre would be very remunerative. Some experiments made in the Segu district in rich soil on the banks of the Niger gave a yield of 8400 kilos of dry stalks and of fibre 1596 kilos of fibre per hectare. On a field in poor soil the yield was found to be 7000 kilos dry stalks and 1316 kilos of fibre per hectare.

In general the fibre is regarded as an efficient substitute for "Jute" (*Corchorus capsularis*) in the manufacture of cordage, sacking or any of the coarser textiles.

The seeds yield an oil to which some attention was drawn in

* See a note on "the 'Da Fou' in Upper Senegal and on the Niger," quoted in *The Inter. Review of the Science and Practice of Agriculture*, Rome, viii. Nov. 1910, p. 69, from *Bull. de l'Office Col. Paris*, No. 29, 1910.

"L'Agronomie Coloniale: Bull. Mensuel du Jardin Colonial," No. 6, December, 1913, by J. Vuillet. It is described as a drying oil of a pale yellow colour which might find a market in the colour and varnish, linoleum industries, &c., and the cake suggested as a possible food for cattle. According to Watt (Comm. Prod. India, p. 631) the seeds yield a clear limpid oil; they have been sent to England as an oil-seed and they are used in Poona as a cattle food.

Specimens of the fibre and oil from India and fibre from West Africa, including French Senegal (sample of "Da") are in No. 1 Museum. J. H. H.

Jubaeopsis caffra.—A palm known as "Inkomba" was discovered in 1909 in East Pondoland, at the mouths of the Umsikaba and Umtentu Rivers, by Mr. Charles Ross, then Conservator of Forests at Umtata. Specimens received at Kew through the South African Museum were submitted to Dr. O. Beccari, who regarded them as belonging to a new genus, of which he published an account, under the name of *Jubaeopsis*, in Webbia, vol. iv, pp. 169-176 (1913), and in Agric. Colon. Ital. x, p. 531, t. 13 (1916). *Jubaeopsis* can be diagnosed from its allies, *Jubaea*, H.B. & K., a monotypic Chilean genus, and *Cocos*, L., thus:—

Jubaea. Stamens numerous. Calyx of male flowers 3-partite, tapering into the pedicel. Endocarp with 3 pores just below the middle.

Jubaeopsis. Stamens 9-16. Calyx of male flowers of 3 free sepals imbricate at the base. Endocarp with 3 pores above the middle.

Cocos. Stamens 6. Calyx of male flowers of 3 free sepals imbricate at the base. Endocarp with 3 pores at the base.

Jubaeopsis caffra, Becc. (l.c.), is a tree with a trunk about 20 ft. high, bearing a crown of pinnate leaves 12-15 ft. long, amongst which the spadices arise and produce female flowers on the lower parts of their branches, and male on the upper. The globose fruit, about 3 cm. in diameter, has a yellow fibrous pericarp surrounding a thick woody endocarp enclosing a central cavity, which, according to Dr. Marloth (Fl. S. Afr. iv. p. 48) is empty, but according to Mr. I. B. Pole Evans, Chief of the Division of Botany, Department of Agriculture, Union of South Africa, who has recently collected fresh ripe nuts, contains "milk just like the ordinary coconut." Dr. Beccari believes that plate 164 in Martius' *Historia Naturalis Palmarum*, erroneously called "*Phoenix reclinata*," represents this plant; it is a reproduction of a drawing of a scene on the Fish River and was sent to Martius by Ecklon.

With the exception of the widely spread *Cocos nucifera*, L., this is the only representative of the *Cocconeae* in the Old World. C. H. W.

Lord Howe Island.—Mr. W. R. B. Oliver, in the Transactions of the New Zealand Institute, vol. xlix. pp. 94-161 (1917), contributes an interesting paper on the vegetation of this island, based mainly on collections, notes and photographs obtained during a stay of fifteen days during November, 1913. Mr. Oliver gives an account of the physiography, climate, and the characteristic plant formations, some of which are illustrated by photographs. The origin of the flora is discussed both from a consideration of the geological history of the island in regard to its probable past land connections with New Zealand, New Caledonia and Australia, and from the affinities of its plants with those from surrounding areas. There are 209 vascular plants known to occur in the island, and to the records of previous collectors Mr. Oliver adds only one species, the widely spread *Kyllinga monocephala*, Rottb., and that is probably a recent introduction. As in most oceanic islands a large proportion of the arboreal vegetation is endemic, in this case 70 per cent. Only 4 of the 169 genera are endemic, two of these being related to New Zealand forms, one to New Zealand and New Caledonian genera, and the fourth (*Howea*) to Malayan and Tropical Australian types. Of the non-endemic genera, 95 are widely distributed and 47 have a wide range but do not occur in New Zealand. Seventy species (about 33 per cent.) are endemic. The Polynesian and New Zealand elements in the endemics are more pronounced than are the Australian, but the latter is more evident in the case of the non-endemic. Considering both the fauna and flora of the island and the present contour of the ocean bed, Mr. Oliver concludes that the forms now existing there originated mainly as an early migration along a former New Caledonian-New Zealand land line, the last land connection having been with the former island. The presence of distinct species of such typical New Zealand genera as *Olearia* and *Coprosma* is noteworthy.

Lord Howe Island would appear to provide ideal material for the study of the "Age and Area" hypothesis recently propounded by Dr. Willis. Mr. Oliver's opinions are shown in a paragraph on "Endemism," and scarcely coincide with Willis's theory, for he bases his conclusions on the "working hypothesis that those species longest in the land will comprise the largest proportion of endemic forms and the highest degree of peculiarity, while the presence of widely distributed species indicates that dispersal is probably still going on, and this in the case of an oceanic island leads one to conclude that no direct land connection is required to explain their occurrence."

The genera are arranged after Engler's system, but it is regrettable that in this valuable contribution the space occupied by the double quotation of the binominals was not used for the names of the families, which are omitted. A new species of *Coprosma* (*C. prisca*), formerly confused with the Norfolk Island *C. Baueri*, Endl., is described in the paper, which concludes with a list of works dealing with the natural history of the island. J. H.